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# Analysis for Military Decision Makers

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Lieutenant Colonel Ben G. Dunn, US Air Force

**Decisions, Decisions, Decisions**—I have yet to meet a person who intentionally makes bad decisions. Sure, with the advantage of hindsight, each of us can identify choices that we wish had been different. But let us start with the assumption that a military decision maker, using available information, and using his or her professional judgment, will make what seems to be the best decision in any given situation. Judgment is that combination of innate character and good sense, tempered by experience, which underpins our approach to making choices. Application of judgment through a logical thought structure is how we analyze situations to arrive at rational decisions.

Most would agree that some degree of analysis is required before arriving at a decision on any complex issue. But analysis has a wide range of meanings. To begin with a dictionary input, it is “a separating or breaking up of a whole into its parts so as to find out their nature, proportion, function, relationship, etc.” That holds equally for historical analysis, chemical analysis, operations research analysis, economic analysis, or any other analysis you care to conduct. In the decision process, however, analysis means *finding, developing, and structuring information in such a manner that the consequences of various choices are illuminated in a way that is useful for the person who must decide.*

## Concepts For Analysis

We noted above that experience is a part of the professional judgment we apply in the decision process. This experience includes both our personal observations and the educational experience of learning from other people's observations. This article is a review of validated concepts which have proven to be useful to others. The concepts discussed below are the basis for the Defense Analysis Course taught at the Naval War College, but have application beyond that single course.

You already have a personal logic structure which you apply in matters of choice. It may be an intuitive process of identifying the problem, considering

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alternative solutions, and acting on the decision. It may be a written report approach, such as the venerable Staff Study format. It may be a formalized academic structure such as the Defense Analysis approach with its five interdependent phases—Formulation; Search; Evaluation; Interpretation; and Implementation/Verification. Each of these frameworks have value only in the use people make of them. Following a checklist is not enough—you still must think and apply your judgment to the analysis leading to your decisions. But there are common concepts in the various frameworks which are worthy of consideration. Rather than a detailed explanation of a single framework, let us instead discuss the underlying concepts so that you may incorporate them into your existing approach to decision making.

**The objective.** Analysis is conducted to determine an appropriate course of action. This action has some intended objective. The initial mapping out of the plan for analysis—the formulation phase of the decision process—serves to classify the central objective, to define issues of concern, and to limit the scope of the analysis. The focus that a careful formulation provides is invaluable in assisting a decision maker arrive at a sound choice. It is more important to address the “right” objective than it is to choose the “right” alternative since even a rough answer to the real question has more merit than an exquisite solution for the wrong problem.

**The alternatives.** Alternatives are the different ways an objective may be achieved. They may surface throughout the decision process. Alternatives need not be obvious substitutes or perform the same specific role. For example, in the protection of noncombatants from air attack, alternatives could include warning networks, shelters, point defense, counterforce strikes, the deterrence provided by retaliatory striking power, or combinations of the above.

**Comparison of alternatives.** With the objective always in mind, evaluation of how alternative choices compare to one another in terms of cost, in terms of effectiveness, and in terms of other important considerations, is determined in this phase of analysis. The perspective of the decision maker is at its narrowest point during the evaluation phase. This is where the mechanical management science techniques frequently put forth as “analysis” have their greatest use.

**Application of judgment.** The interpretation phase of analysis is where the executive perspective of the decision maker combines the quantitative and subjective evaluations to arrive at a choice. The discrimination among alternatives takes into account the degree of importance of each factor that was evaluated, and weighs it in its relation to the other factors. In this way the decision maker decides.

**Acting on the decision.** Implementation of the choice must be a consideration in a complete decision process. Aesop’s fable of “The Mice in Council” illustrates this point. You may recall the story of how a community

of mice, experiencing losses to a vigilant cat, held a meeting to discuss solutions to their problem. One young mouse made a proposal which met with approval. If the cat wore a bell around her neck that would tinkle with every step, then the mice would know of her approach and be able to avoid the danger. The group's joy was short-lived, however, when an older mouse pointed out one drawback in the plan. The young mouse had not told them who should put the bell around the cat's neck. It is easy enough to decide to "bell the cat" but execution of the plan should be a consideration.

**Following up after the decision.** A sometimes neglected phase of the decision process is the verification step. After going through an analysis leading to a decision, then putting the chosen alternative into effect, common sense dictates a follow-up to confirm that the action accomplished its intended objective.

### Objective—The Prime Consideration

In searching for solutions to problems involving choice, the first requirement is to identify the objective to be achieved. Finding good answers depends in large part on knowing what it is that you want to do.

Misidentification of the ultimate objective can lead to ludicrous results. At the height of World War II, the British Ministry of Aircraft Production kept facilities busy producing the Whitley bomber even though it was an obsolescent type. The Whitley continued in production until the middle of 1943, and six times the original number of aircraft planned were finally produced. Many, perhaps most, of the Whitleys produced never left aircraft storage units. From the perspective of several decades, it is apparent that the Whitley contributed little to the war effort, but it did make a significant contribution to the statistical record documenting aircraft production.<sup>1</sup>

Conversely, World War II provides many examples of rational choices resulting from intelligent analysis focused on achieving properly defined objectives. The following example shows a valid identification of the ultimate objective which almost went awry. "Early in World War II a great number of British merchant vessels were being sunk or seriously damaged by Axis aircraft attack in the Mediterranean. The obvious answer was to equip these ships with antiaircraft guns and gun crews. This was done at great expense of men and equipment badly needed elsewhere. Questions concerning the soundness of this allocation of scarce resources were raised when reports showed that the gun crews were shooting down only about 4 percent of all attacking aircraft. This was a poor showing and seemed to indicate that the AA guns and crews were not worth the cost of installation. On more careful consideration, it was realized that the guns were not there primarily to shoot down German or Italian aircraft, but to protect the merchant vessels. In fact, as figures were accumulated, it became apparent that the AA guns and crews were doing the job rather

well; of the ships attacked, 25 percent of those without protection had been sunk, while only 10 percent of the ships with protection were lost in the same period.”<sup>2</sup>

Understanding such concepts as the identification of the real objective can help you spot the hidden defects in elegantly presented, but ineffective attempts at analysis. Better still, application of these concepts can help you conduct, or guide your staff in conducting, truly useful analysis of complex, ill-defined, far-reaching decision situations.

**Information Collection.** As you focus in on the objective, part of your attention should be concerned with information requirements. This ongoing part of the decision process requires the sorting out of critical facts, variables, assumptions, and relationships that bear on the problem at hand. In your day-to-day environment, you are immersed in a sea of information. Only a part of what you know (and what you don’t know) is relevant to any particular decision. Extracting the relevant from the irrelevant is vital to a clear, concise analysis. The sorting of information goes on throughout the analysis. While thoughts should be noted down as they occur so they do not become lost in the shuffle, the elements in the process will not crystallize until the whole analysis nears completion. To illustrate, the identified objective should suggest a way to measure effectiveness. This, in turn, helps to identify alternative ways the objective might be satisfied. As any self-imposed or external constraints become known, they shape the direction of the analysis. All of these contribute to the identification of that information which is relevant to the decision.

### Alternative Ways To Achieve The Objective

The identification of appropriate alternative ways to accomplish the objective is a logical element in the decision process. If there is only one way to achieve an objective, then there is no need for comparative analysis—there is no choice in the matter. Before accepting this result, reexamine your statement of the objective to ensure that you defined the situation correctly. Consider the difference between the objectives: “Build bachelor officers’ quarters (BOQ) for 100 persons”; and the objective “provide housing for 100 unaccompanied officers.”<sup>3</sup> The first statement has a built-in bias which excludes what may be other attractive alternatives, such as contracting for quarters or paying individuals the basic allowance for quarters (BAQ), and having them live on the local economy.

**Packaging Alternatives for Comparison.** In developing alternative ways to achieve an objective, it is useful to think in terms of “packages.” We can package our alternatives at any level of complexity consistent with the situation being analyzed. For example, an F-14 standing alone is no more than an expensive static display. Package the F-14, to include the airframe,

aircrew, armament, and necessary support equipment, and you have a potent weapon system capable of achieving an objective. Depending on your particular focus for analysis, you might want to compare alternative warheads for a particular missile, alternative armament loads for the F-14, or substitution of F/A-18 squadrons for F-14 squadrons. One could even consider an entire carrier battle group as a package, and compare it to other alternatives that might satisfy certain objectives. Figure 1 is a simplified diagram of how alternatives might be packaged for comparison.

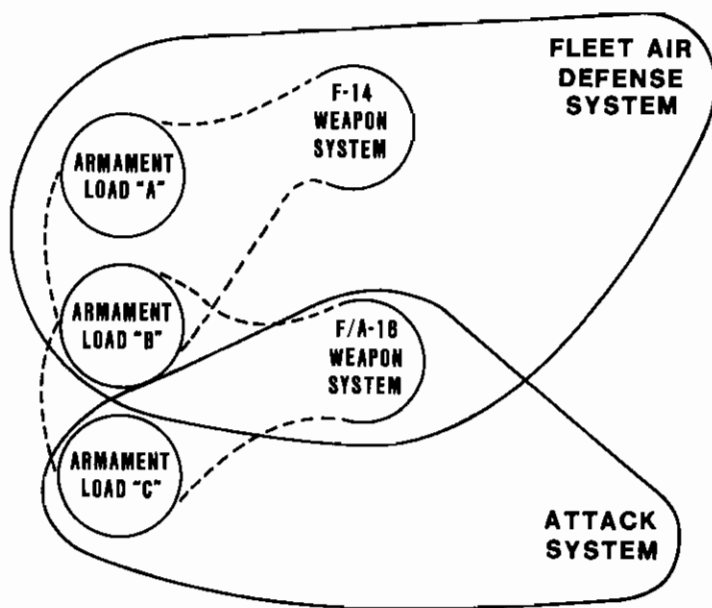


Figure 1. The packaging of your systems for comparison depends on the scope and intent of your particular analysis.

There are unlimited ways to package and compare military capabilities. The hard part is to package in such a way that a comparison of alternatives is meaningful in the decision process. An implicit packaging of alternatives is involved in the statement "... as few as seven B-1B sorties per day with conventional 500 pound bombs equals the firepower of a Nimitz-Class aircraft carrier."<sup>4</sup> Taken in isolation, such a comparison is both irrefutable and incomplete. Both carriers and bombers do more than deliver 500-pound bombs. In comparing military capabilities, and their associated costs, too narrow a focus on a single role unfairly handicaps those weapon systems which have multiple roles.<sup>5</sup> The packaging of alternatives for analysis—and the analysis itself—should be kept as simple as possible, but no simpler.

### Quantitative Evaluation

Once the feasible alternatives have been identified, the next step is to quantify, insofar as possible, the costs and benefits which would occur with

the selection of an alternative. Inherent in this process is the establishing of one or more criteria against which to judge the different alternatives. After determining a set of appropriate measuring scales common to each alternative, a useful technique is to fix either the level of cost (additional resources needed to field and operate each alternative) or effectiveness (the degree to which an alternative need satisfy attainment of the objective). One may then compute the other function for each alternative and thereby establish a quantitative order of preference. For a fixed cost project, we might prefer to implement that alternative which promised to produce the greatest effectiveness. If a specified level of effectiveness is required, we might prefer to choose that alternative which accomplished this level at least cost. The following example demonstrates the ramifications of approaching a decision from either a "fixed cost" or a "fixed effectiveness" perspective.

The Marine Corps has been pushing for a new medium assault transport for some 15 years. In 1981, the DoD supported a "Mission Essential Needs Statement" for HXM, the Marines' single solution replacement aircraft for the CH-46 helicopter. There was a difference of opinion, however, between the USMC and the Navy hierarchies as to how an HXM program should be structured.

" . . . The HXM competition, as the Marines see it, would call for a 'top-down' approach: requirements which industry must build to are the constant, thereby leaving price as the variable; the objective being to build the machine the Marines want but at the lowest cost . . . .

"The Navy is also concerned with cost—but more so, apparently, than ensuring that Marine requirements are met. In fact, the Navy's proposed form of competition downplays the importance of meeting Marine requirements: its plan sets cost as the dominant factor, with contractors offering proposals on a sliding scale to trade price for capability."<sup>6</sup>

Either approach can be useful. Part of the job in decision making is to structure your analysis to fit the specific situation. Often we might prefer to compare alternatives at a fixed level of military capability, but it is rare that price is not a factor. The "fixed cost" approach the Navy preferred for the HXM has considerable merit in many situations. This approach is especially valid in situations involving trade-offs in the allocation of finite resources. The resources might be budget dollars for procurement programs—ship construction vs. munitions stock for instance. The resources might be of immediate tactical concern—attack sorties for close air support vs. interdiction. When the resource "pie" is only so big, everyone cannot have as large a helping as they might want. It would not make sense to devote a disproportionate share of the resources to one effort if another equally important segment of responsibility is then left unsupported. Making these judgments is where you earn your pay as a military executive.

**Measuring Cost and Effectiveness to Compare Alternatives.** Costs may be measured in terms of dollars or in some other quantifiable terms. Using the Whitley bomber example again, the "cost" of its production might be measured in man-days of skilled labor, pounds of scarce materials, or numbers of other aircraft which could have been produced in its stead. The "cost" in the Whitley's case could be thought of in terms of resources used or in terms of opportunities lost because of its production. The Whitley's effectiveness might have been measured in tons of bombs it could have delivered on targets, on area of sea-lane patrol it might have covered, in terms of aircrew training it might have accomplished, or as evidently was the case, on numbers of aircraft produced. Recognizing how results are being measured will tell you a lot about the real objectives being addressed.

### Subjective Evaluation

Often there are factors which are important considerations in decision making, but which are not quantifiable in any conventional sense. Subjective factors can be as important, or even more important than quantitative factors in the decision process. A strictly economic analysis, concerned with only the cost and effectiveness of obtaining transportation from home to work and back, might argue for the purchase of a particular type of automobile. Chances are that your parking lot has a few vehicles in it more suited to the race track than to the basic transportation role which they actually perform. This is not to say that their owners made a poor choice in their purchase. Rather, cost and effectiveness were not the only considerations that played in the decision.

Identifying and evaluating subjective factors are often as important for enlightening a decision maker as are the cold, hard cost/effectiveness calculations. It is also a good way to reintroduce those important side benefits an alternative package might possess, but which were excluded in the confines of the quantitative evaluation. In a narrowly constructed comparison of the capabilities of attack aircraft, the numbers may indicate that the F/A 18 is not as good a choice as the A-6. The fact that the F/A-18 can be a fighter when needed, then be recycled as an attack aircraft, can be important when deciding the desired makeup of a carrier air wing.

**The Iterative Decision Process.** As you go through the decision process, it is likely that you will find a need to revise and refine the work you have already done. You may surprise yourself with the magnitude of the changes that occur. Even your conceptualization of the real objective may change as you work through the analysis. It is an iterative process. As you learn more about the details, the assumptions, the missing information, and the subjective factors that impact upon your decision, the entire flavor and direction of your analysis may differ significantly from what you originally



expected. You may need to completely revise the formulation you started with. If the alternatives you identified are found wanting, now is the time to take a new look at what you are doing in the analysis, and why you are doing it. Perhaps you have identified a symptom rather than finding the real objective that needs to be satisfied. Consider the following example:

"During the Vietnam War, the breakdown of heavy duty military trucks was a problem to the United States forces. Specifically, the clutches and transmissions were failing on otherwise satisfactory equipment, built to rigorous specifications. Those in charge of repairs believed that the problem was due to either the quality of the workmanship or more likely, the peculiar nature of the Vietnamese terrain and the unusual demands being placed upon the equipment. As a result, efforts were directed toward improving the overhaul and repair record at the repair center. One ambitious goal after another was set and achieved to get those trucks back on the line. It occurred to someone that the real cause might be something else and that we were treating the symptoms rather than the cause. To be brief, the inquiry led to the discovery that most of the vehicles were driven by Vietnamese civilian drivers, whose average height was about a foot less than that of Americans. As a consequence, the civilian drivers could only depress the clutch pedal part way and had to 'ride the clutch' in going through multiple gears or speeds. We all know that such a practice, if done around the clock, can cause trouble with the clutch and transmission. The solution—attach a block of wood to the clutch pedal to permit the driver with short legs to depress it to the floor as required. It worked. The real problem was solved, not the symptom."<sup>8</sup>

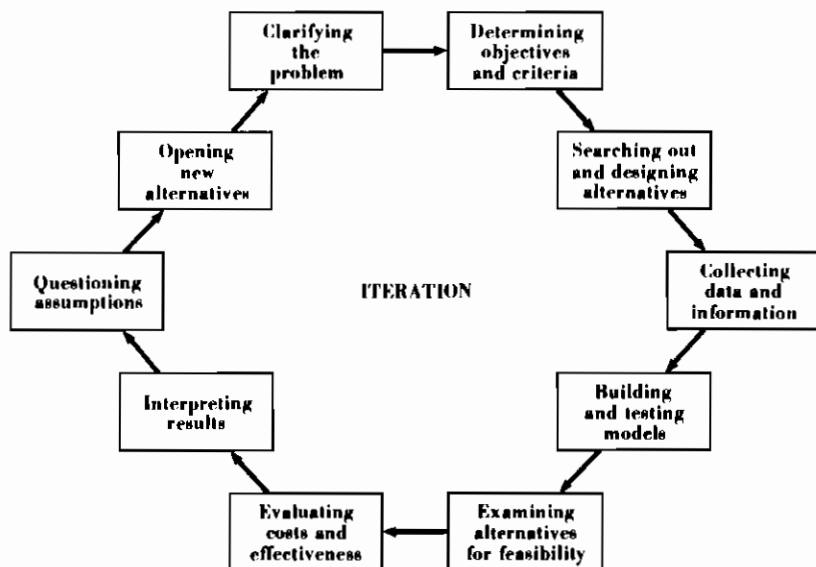


Figure 2 The iterative nature of analysis<sup>7</sup>

## Interpretation—The Judgmental Phase

The final part of analysis leading to a decision is to draw all that you learned into a coherent, rational, supportable recommendation for action, or inaction as the case may be. This interpretation of results involves bringing both the quantitative results and the subjective factor evaluation into a common discussion. The relative merits of *all* the considerations play a role in the decision process.

## Implementation and Verification

Once a decision is made, you are not off the hook. Implementation of the chosen alternative, a factor which you should have considered in your analysis, comes into play. Depending on the situation, you may be called upon to assist in the implementation process. The knowledge and insight you developed in the analysis may prove to be invaluable in actually getting the chosen alternative off the ground.

Verification is the step that closes the loop. Having defined the situation, analyzed various alternative solutions, chosen a course of action, and put that alternative into effect, it is reasonable to step back and see if the problem was “fixed” as predicted. If not, the job is not over. You may find that you overlooked essential factors in your analysis which require a “new look” now that they have surfaced. You may find that the environment has changed to the extent that your solution no longer is appropriate to current conditions. You may find that minor adjustments to your alternative makes everything work right. Best of all, you may find that your analysis of the situation, and proposed course of action, were “right-on”—everything works as advertised.

## Communication—Inescapable in Defense Analysis

A final comment has to do with communication, both between the decision maker and his staff, and between the decision maker and his audience. Part of our military training causes us to strive to get the job done without unduly bothering “The Boss.” This can-do attitude, this striving to operate without the need for detailed supervision, is admirable and is a great strength in the American military services. It can be carried too far in conducting a meaningful decision orientated analysis. Participation by the decision maker in the analytic process can prevent some wasted effort. A few minutes of direct interaction between a staffer and the boss at critical points can ensure that both are aware of the direction the analysis is taking—that in fact the correct situation and the proper inputs are being considered. It can be disconcerting for all concerned if the decision maker wants to know how many bullets to buy during the coming year and the staff works up a study on how best to manufacture munitions.

While the captain of a ship may have little cause to explain decisions, such is not the case for the military executive who faces a more independent audience. Associates, peers in other service communities, or public figures may question your reasons for certain decisions. To cite "professional judgment" may not suffice. But a clear articulation of the factors considered in evaluating alternative ways to accomplish a specified objective will go far in confining critics to the merits of your case rather than to emotional appeals.

## Summary

The purpose of this article was to remove some of the mystique that may shroud the decision process. Good analysis is not easy—neither should it be feared. Making decisions is something you do every day. The degree of analysis required depends on the specific situation in which you find yourself. In some cases you can mentally conduct a complete analysis in minutes. In other cases months of effort by teams of people may only start the process of thorough, meaningful analysis. The value of an analysis cannot be judged by the weight of the final report or by the hours of computer time used in making the numerical calculations. Rather, the value of an analysis is in the degree of understanding provided to the decision maker to facilitate the making of an intelligent choice. The decision process concepts described on these pages do not guarantee that the correct choice will be made. They do support a systematic, logical thought structure, to be harnessed with professional judgment, to produce rational, understandable decisions.

## Notes

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2. United States Naval Academy, *Naval Operations Analysis*, 2nd ed. (Annapolis, Md: Naval Institute Press, 1977), p. 10.
3. Department of the Navy, *Economic Analysis Handbook*, NAVFAC P-442 (Washington: July 1980), pp. 4-5.
4. Gary P. Betourne, "B-1B Maritime Support Capability," AF/SASB Paper, (Hq. USAF ACS/Studies & Analysis: January 1982), p. 2.
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8. Alexander H. Cornell, *The Decision Maker's Handbook* (Englewood Cliffs, N.J.: Prentice-Hall, 1980), pp. 44-45.



